2018 Heliophysics Science Mission of Opportunity (HPSMO) Solicitation

Pre-Proposal Conference

Technical, Management, and Cost Evaluation

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Outline

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- HPSMO PEA M Solicitation Highlights
- Technical, Management, and Cost (TMC) Evaluation Process
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- Questions

Introduction

Purpose of this Presentation

1. Present some HPSMO PEA M highlights
2. Present a short overview of the Technical, Management and Cost (TMC) Evaluation of proposals submitted as a result of the 2018 Heliophysics Science Mission of Opportunity (HPSMO) Program Element Appendix (PEA) M of the Third Stand Alone Missions of Opportunity Notice (SALMON-3) Announcement of Opportunity (AO).
3. Answer questions

Important Note: This PEA is to the SALMON-3 AO. All proposers must read the PEA & the SALMON-3 AO carefully, and all proposals must comply with the requirements and constraints contained within the two documents.

2018 HPSMO PEA M Highlights

Types of Missions of Opportunity: PEA Section 5.1

- Selected Missions must be responsive to NASA Heliophysics Science Goals.
- Three Mission of Opportunity types may be proposed in response to this solicitation: (1) Partner Missions of Opportunity (PMOs), which may include CubeSats, payloads on the International Space Station (ISS), and instruments hosted by a non-NASA spacecraft (e.g., DoD, NOAA, commercial) with goals in addition to those of the proposed investigation, and instruments hosted by the limited category of NASA spacecraft for which a PMO is allowed, (2) New Missions using Existing Spacecraft (NMES), and (3) Small Complete Missions (SCMs). SCMs are ISS payloads, commercial hosted payloads, CubeSats, SmallSats or suborbital class (Super Pressure Balloon (SPB), Long Duration Balloon (LDB)) or Suborbital Reusable Launch Vehicle (sRLV) investigations.
- SALMON-3 AO Section 5.1 provides complete descriptions of these types of MOs as well as constraints and requirements for proposals. Additional requirements for this PEA are listed in the following sections.
  1. PMOs – PEA Section 5.1.1
  2. NMESs – PEA Section 5.1.2
  3. SCMs – PEA Section 5.1.3
- PEA Section 5.4.1 specifies schedule requirements specific to PMO and SCM investigations
- PEA Section 5.3.6 specifies access to space or near space requirements.

Notification Proposals: PEA Section 6.1.2

- To facilitate planning of the proposal evaluation, in particular to avoid conflicts in the peer review process, and to inform prospective proposers of any changes to this AO, NASA requires all prospective proposers to submit a Notification Proposal through the Authorized Organizational Representative (AOR) of the PI institution. The Notification Proposal replaces the Notice of Intent for this AO. Deadline for Notification Proposals is 11:59 pm EDT, October 1st, 2018 **(Updated August 24, 2018)**.

- Full (Step-1) Proposals will not be accepted without prior submission of a Notification Proposal. Invitations will be provided to those satisfying NSPIRES requirements. This is not the outcome of an evaluation. Submission of a Notification Proposal does not commit the team to submitting a Full Proposal.

- Requirement M-35. Proposers shall submit electronically through NSPIRES a Notification Proposal that names the organizational lead from each organization and the organization's role; identifies all investigators, the proposed science objectives, general mission architecture, a list of instruments, and identification of new technologies that may be employed as part of the mission; and answers PEA-specific questions. The science objectives of the proposed investigation and the PI, Co-I, and institutions cannot be changed between submissions of the Notification Proposal and the Full (Step-1) Proposal.

Payload Risk Classification: PEA Section 5.3.3

- Streamlined Class D - Additional Tailoring
  - Streamlined Class-D Investigations must identify those requirements not specifically identified as already being tailored in the NASA Science Mission Directorate (SMD) Class-D Tailoring/Streamlining Decision Memorandum and described in NPR 7120.5E that are proposed for adjustment, provide a rationale for each adjustment, and describe any cost, schedule, and/or other benefits that would be realized should one or more of the adjustments be accepted by NASA. Note that these adjustments reflect potential modifications to the baseline investigation, to be addressed after down-selection.
  - Investigations in other risk classes (i.e., A, B, or C) may also contain proposed adjustments to NASA requirements. Proposers must identify the tailorable requirements described in NPR 7120.5E that are being adjusted, provide a rationale for each adjustment, and describe any cost, schedule, and/or other benefits that would be realized should one or more of the adjustments be accepted by NASA. Note that these adjustments reflect potential modification to the baseline investigation, to be addressed after down-selection.
  - The panel evaluating the third evaluation criterion, TMC Feasibility of the Proposed Investigation Implementation, will provide comments to the Selection Official on the proposed adjustments and their justifications. These comments will not be considered for the TMC Feasibility of the Proposed Investigation Implementation risk rating but may be considered in the selection decision.

HPSMO PEA M Highlights

Section 5.3.6 Access to Space, or Near Space

- The following classes of platforms represent NASA-PEA-provided access to space, or near space:
  - SCMs on International Space Station (ISS)
  - Balloon vehicles and balloon launch services for missions on high-altitude scientific balloons
  - Platforms to host payloads on sRLVs
  - Launch and deployment services for a single 1U, 1.5U, 2U, 3U, 6U, or 12U CubeSat.
  - Constellations of CubeSats or a SmallSat.
  - One or two ESPA Grande ports utilizing NASA-PEA-provided IMAP ESPA Grande access to space. Any Science MO SCM that is launched on the IMAP EELV must be deployed from the ESPA Grande.

- For alternative (non-NASA-PEA-provided) access to space, the following requirements are in addition to those given in SALMON-3 AO Section 5.3.8:
  - For proposed non-NASA-PEA-provided secondary or co-manifested launch services, or investigations proposed as hosted payloads, the PI assumes all risk for any delays in the implementation of the launch services and/or parent mission and shall, therefore, propose appropriate reserves for such schedule contingencies. (See Requirement M-21)
  - Proposals may include purchased or contributed non-NASA-PEA-provided primary, secondary, or co-manifested launch services obtained from a U.S. partner. (See Requirement M-22)
  - In addition to the requirements given in the SALMON-3 AO, all proposed SCM investigations, with the exception of investigations requiring flight on the ISS, suborbital-class missions, or launch services purchased directly by the investigation, shall also provide a Letter of Commitment from the program or agency providing access to space. (See Requirement M-23)

HPSMO PEA M Highlights

Section 5.1.3.1 Investigations Utilizing IMAP ESPA Grande Access to Space

- SCMs may utilize the NASA-PEA-provided IMAP ESPA Grande access to space, which for this option is in the form of a secondary payload, termed Rideshare Payload
- Information on the ESPA Grande can be found in the *NASA's Mission Specific Evolved Expendable Launch Vehicle Secondary Payload Adapter (ESPA) System Interface Specification (SIS) For Heliophysics Missions of Opportunity* document (ESPA SIS), found in the Program Library
- For investigations utilizing NASA-PEA-provided IMAP ESPA Grande access to space:
  - Proposals shall clearly demonstrate compliance to the ESPA Grande requirements and enveloping characteristics, as given in the ESPA SIS. (See Requirement M-6)
  - Proposals shall utilize one or two ESPA Grande ports. Investigations requiring two ports shall comply with the ESPA SIS for each port. (See Requirement M-7)

Section 5.6 Cost Requirements

- The PEA M Cost Cap in FY 2019 dollars: (See Requirement M-25)
  - $75M for SCMs using NASA-PEA-provided IMAP ESPA Grande
  - $55M for SCMs and PMOs not utilizing NASA-PEA-provided IMAP ESPA Grande
  - $35M for NMES and suborbital-class SCMs
- The *LSP Small Payload Access to Space Catalog*, available through the Program Library lists the options and costs for NASA-PEA-provided access to space. (See Section 5.6.2)
- The Phase A concept study is capped at $400,000 FY 2019 dollars, with a duration of 9 months. (See Section 5.6.3)
- Required minimum unencumbered cost reserves percentage: (See Section 5.6.4)
  - Phases A/B/C/D cost is 25%
  - Phases E and F cost is 15%
- Contributions and funding from other SMD programs is not permitted, however there is no limit to the value of contributions from non-SMD or non-NASA sources. (See Section 5.6.6)
- See Requirement M-22 for launch service advisory service fees required for proposals that use non-NASA-PEA-provided launch services.

Classified Materials : PEA Sec 5.8 supersedes SALMON-3, 5.9.4

In order to increase the capabilities of investigations proposed in response to this PEA, while minimizing the development and operations risks within the PIMMC, proposers may choose to leverage technology with classified heritage that was developed by other institutions and agencies as well as technology developed by NASA and NASA-funded partners. NASA allows 3 options to support heritage claims from classified programs.

Delivery to NASA (see PEA Section 5.8.1)
The delivery to NASA option of a classified appendix regarding heritage requires delivery to NASA Headquarters (HQ) separately from the proposal. A single copy of the classified appendix regarding heritage must be submitted along with a cover letter referencing the submitted proposal by name, PI, and proposing organization.

Delivery in Place (see PEA Section 5.8.2)
Proposers may choose to utilize the option for "delivery in place" of the classified appendix regarding heritage, where the classified material is not delivered to NASA but is kept at the point of origin.

Sponsor Verification (see PEA Section 5.8.3)
Proposals that include technologies with classified heritage may utilize sponsor verification. This option is only available if the sponsor organization is not a team member in the proposal. Such proposals would only reference classified materials, including associated cost basis of estimates; the materials would not to be provided to NASA in any format. In lieu of a direct review of the classified materials, the evaluation panel will compile a list of questions regarding claims made in the proposal that need to be substantiated by the classified material. The list would be sent to the sponsor of the classified programs who must verify that the claims are supported.

TMC Evaluation Process

TMC Evaluation Process

Evaluation criteria:

- Science Merit of the Proposed Investigation (Form A)
- Science Implementation Merit and Feasibility of the Mission or Investigation (Form B)
- **TMC Feasibility of the Mission or Investigation Implementation (Form C)**

Weighting: The first criterion is weighted approximately 40%; the second and **third criteria are weighted approximately 30% each.**

TMC Evaluation: The purpose of the TMC evaluation is to assess the likelihood that the submitted mission or investigation's technical and management approaches can be successfully implemented as proposed, including an assessment of the likelihood of completion within the proposed cost and schedule.

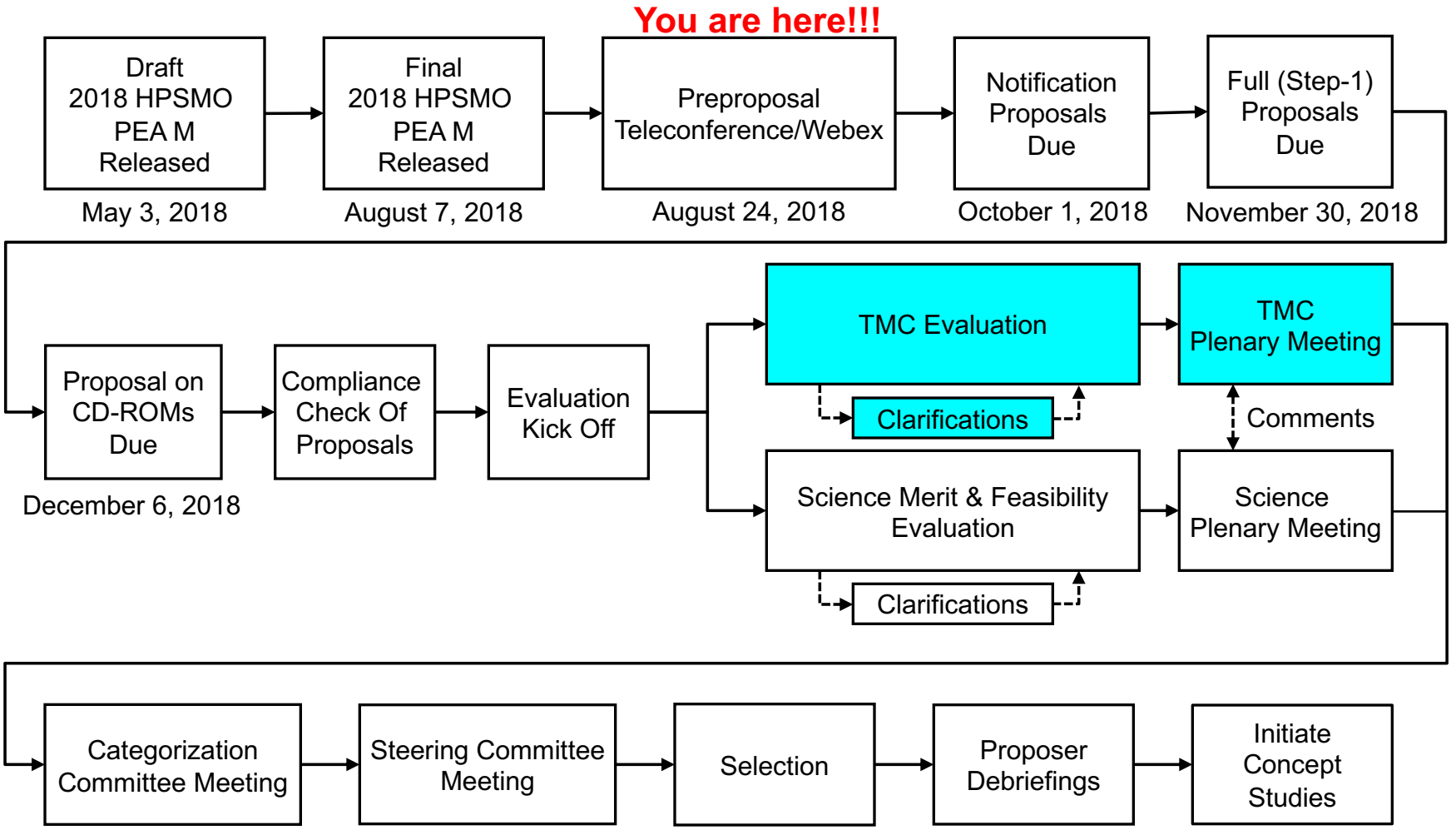
Scientific/Technical Evaluation: PEA Section 7.1

- The evaluation process will be as described in Section 7.1.1 of the SALMON-3 AO. As part of that process, NASA will request clarifications on potential major weaknesses on both the *Intrinsic Science Merit of the Proposed Investigation* and the *Experiment Science Implementation and Feasibility Merit of the Proposed Investigation*; these will be in addition to those for the *TMC Feasibility of the Proposed Investigation Implementation* specified in Section 7.1.1 of the SALMON-3 AO.

- Proposals will be evaluated according to the evaluation criteria set forth in Section 7.2 of the SALMON-3 AO, with the exception of Factors B-5 and C-4 for Streamlined Class-D missions, which are amended to delete evaluation of the PI's spaceflight experience.
  - In Factor B-5, "Probability of investigation team success," the scientific expertise of the PI will be evaluated but not his/her experience with NASA missions.
  - In Factor C-4, "Adequacy and robustness of the management approach and schedule, including the capability of the management team," the capability of the management team will be evaluated as a whole, as opposed to assessing the capabilities of each of the Key Team Members independently.
- Comments about the managerial experience of the PI, and whether appropriate mentoring and support tools are in place, will be made to the Selecting Official but these comments shall not impact the "Science Implementation Merit" or the "Technical, Management, and Cost Feasibility" ratings.

TMC Evaluation Process

2018 HPSMO PEA M Solicitation, Evaluation and Selection Flow



TMC Evaluation Factors

The following are highlights of the criteria listed in Section 7.2.4 of the SALMON-3 AO, "TMC Feasibility of the Mission or Investigation Implementation"

The technical and management approaches of all submitted investigations will be evaluated to assess the likelihood that they can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule. The factors for feasibility of investigation implementation include the following, as applicable for the investigation being proposed:

Factor C-1. Adequacy and robustness of the instrument implementation plan.

Factor C-2. Adequacy and robustness of the investigation design and plan for operations.

Factor C-3. Adequacy and robustness of the flight systems.

Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.

Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.

TMC Evaluation Process

TMC Evaluation Principles

- **Basic Assumption**: **Proposer is the expert on his/her proposal.**
  - Proposer's task is to provide evidence that the investigation implementation risk is low.
  - TMC panel's task is to validate proposer's assertion of low risk.
- Merit is to be assessed on the basis of material in the proposal. All proposals are evaluated to identical standards and not compared to other proposals.
- TMC Panels consist of evaluators who are non-conflicted experts in the areas of the proposals that they evaluate.
- TMC Panels develop findings for each proposal - Findings: "As expected" (no finding), "above expectations" (strengths), "below expectations" (weaknesses).
- The Cost Analysis is integrated into overall TMC Risk Assessment.
- Proposal Risk Assessment:
  - Proposals are based on Pre-Phase-A concepts; TMC Risk Assessments give appropriate benefit of the doubt to the Proposer.

TMC Evaluation Process

TMC Panel Evaluation Findings Definitions

- **Major Strength:** A facet of the implementation response that is judged to be well above expectations and can substantially contribute to the ability of the project to meet its technical requirements on schedule and within cost.
- **Minor Strength:** A strength that is worthy of note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.
- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its technical objectives on schedule and within cost.
- **Minor Weakness:** A weakness that is sufficiently worrisome to note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.

Note: Findings that are considered "as expected" are not documented in the Form C.

TMC Evaluation Process

TMC Risk Ratings: Low, Medium, High

TMC Evaluation - The purpose of the TMC evaluation is to assess the likelihood that the submitted missions or investigations' technical and management approaches can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule. Ratings as defined in SALMON-3 section 7.2.1:

Low Risk: There are no problems evident in the proposal that cannot be normally solved within the time and cost proposed. Problems are not of sufficient magnitude to doubt the proposer's capability to accomplish the investigation well within the available resources.

Medium Risk: Problems have been identified, but are considered within the proposal team's capabilities to correct within available resources with good management and application of effective engineering resources. Mission design may be complex and resources tight.

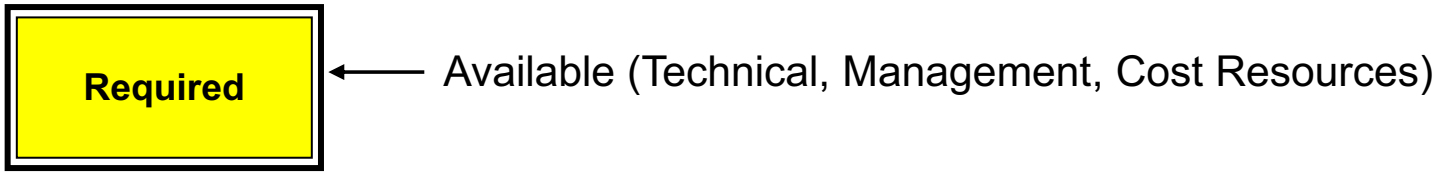
High Risk: One or more problems are of sufficient magnitude and complexity as to be deemed unsolvable within the available resources.

TMC Envelope Concept

Envelope: Contains all TMC Resources available to handle known and unknown development problems that occur. Includes schedule and funding reserves; reserves and margins on physical resources such as mass, power, and data; descope options; fallback plans; and personnel.

Low Risk: Required resources fit well within available resources.

Medium Risk: Required resources just barely inside available resources.



High Risk: Required resources DO NOT fit inside available resources.

Potential Major Weaknesses Clarification Process

NASA will request clarifications of Potential Major Weaknesses (PMWs) identified by the Science Evaluation panel in the first two criteria: Intrinsic Technology Merit of the Proposed Investigation, Experiment Technology Implementation Merit and Feasibility of the Proposed Investigation. NASA will request clarifications of PMWs identified by the TMC panel in the third criteria: TMC Feasibility of the Proposed Investigation Implementation. NASA will request such clarification uniformly from all proposers.

- All requests for clarification from NASA and the proposers' responses are in writing.
- The ability of proposers to provide clarification to NASA is extremely limited, as NASA does not intend to enter into discussions with proposers.
- PIs whose proposals have no PMWs are informed that no PMWs have been identified at that time.
- The form of the clarifications is strictly limited to a few types of responses:
  - Identification of the locations in the proposal (page(s), section(s), line(s)) where the PMW is addressed.
  - Noting that the PMW is not addressed in the proposal.
  - Stating that the PMW is invalidated by information that is common knowledge and is therefore not included in the proposal.
  - Stating that the analysis leading to the PMW is incorrect and identifying a place in the proposal where data supporting a correct analysis may be found.
  - Stating that a typographical error appears in the proposal and that the correct data is available elsewhere inside the proposal.

The PIs are given at least 24 hours to respond to the request for PMW clarification. Any response that goes beyond the five forms of clarification stated above will be deleted and not shown to the evaluation panel.

TMC Evaluation Process

TMC Cost Analysis:

- Initial cost analyses is accomplished on the basis of information provided in the proposals (consistency, completeness, proposed basis of estimate, contributions, use full cost accounting, maintenance of reserve levels, cost management, etc.).
- One or more cost models are utilized to validate the proposed cost.
- Implementation threats are identified.
- Cost threat impacts to the proposed unencumbered reserves are assessed. The remaining unencumbered reserves are compared to the minimums required in the PEA (25% for Phases A/B/C/D and 15% for Phases E/F, PEA Section 5.6.4).
- The entire panel participates in Cost deliberations.
- Significant findings are documented in the Cost Factor on Form C and considered in the TMC Risk Rating.

TMC Cost Analysis: Cost Threat Matrix

- The likelihood and cost impact, if any, of each weakness is stated as "This finding represents a cost threat assessed to have an Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a Very Minimal/Minimal/Limited/Moderate/Significant/Very Significant cost impact being realized during development and/or operations, which results in a reduction from the proposed unencumbered reserves."
- The likelihood is the probability range that the cost impact will materialize.
- The cost impact is the current best estimate of the range of costs to mitigate the realized threat.
- The cost threat matrix below defines the adjectives used to describe the likelihood and cost impact.
- The minimum cost threat threshold is $250K

		Cost Impact (CI) % of PI-managed mission cost to complete Phases B/C/D or Phase E not including unencumbered cost reserves or contributions				
		Minimal (2.5% < CI ≤ 5%) (2.5% < CI ≤ 5%)	Limited (5% < CI ≤ 10%) (5% < CI ≤ 10%)	Moderate (10% < CI ≤ 15%) (10% < CI ≤ 15%)	Significant (15% < CI ≤ 20%) (15% < CI ≤ 20%)	Very Significant (CI > 20%) (CI > 20%)
Likelihood (L, %)	Almost Certain (L > 80%)					
	Very Likely (60% < L ≤ 80%)					
	Likely (40% < L ≤ 60%)					
	Possible (20% < L ≤ 40%)					
	Unlikely (L ≤ 20%)					

Note: For each proposal the percentages in the above table will be converted to dollars by the cost estimator.

Common Causes of Major Weaknesses References

- Technology Readiness Level:
  - *Assessment of TRL in the AOs and Common Causes of Major TRL Weaknesses*
  - *An Example for Demonstrating System Level TRL*
  - Located in Program Library
- Management:
  - *Common Management Major Weaknesses in Step One Proposals*
  - Located at the SOMA website

2018 HPSMO Reference Material

2018 Heliophysics Science MO Acquisition Home Page

The 2018 HPSMO Acquisition Home Page, available at https://soma.larc.nasa.gov/2018HelioMO/, will provide updates and any addenda during the solicitation process. The contents of the acquisition page include the following:

- Announcements
- NSPIRES for access to the solicitation
- Program library
- Evaluation plan (to be posted)
- Questions & Answers
- Preproposal Conference presentations

2018 Heliophysics Science MO Program Library

The Library provides additional regulations, policies, and background information. The Library is accessible at https://soma.larc.nasa.gov/2018HelioMO/programlibrary.html

Questions

All further questions pertaining to the SALMON-3 PEA-M

MUST
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